BAVARIA.

On my arrival at Munich I was sorry to find that Herr Von Mantel, who had been so long at the head of the Bavarian Forest Department, and well known as one of the ablest and most experienced forest officers in Germany, had retired on a pension, and I did not thus have the benefit of his advice and assistance during my stay in that kingdom. Herr von Baldinger, one of the forest councillors, was acting in charge, and I found him most kind and attentive in giving me information, chalking out my route, &c., although, from not having previously had immediately to do with such matters, nor arranged a general plan with Dr. Brandis as Herr Von Mantel had done, he was naturally somewhat at a loss as to what districts would prove most instructive and best repay a visit by an Indian forester. We eventually settled upon two, besides Aschaffenburg and the Spessart, which I had pre-determined to visit after seeing something of the Black Forest.

Districts visited.

The districts selected were in the *Bayerische Wald* and *Schwaben*, and eventually the time at my disposal only permitted me to visit the latter, which I much regretted, as the Baierische Wald is particularly recommended by Dr. Brandis as deserving a visit, and cannot indeed fail to be interesting and instructive, as it still contains much indigenous or virgin hill forests, now being gradually brought under systematic management, and offers an opportunity of seeing how things are managed as to construction of rough hill roads and slips, transport of timber from the higher slopes, and floating in the valleys down the mountain streams and on the river Regen. I was, however, more reconciled to the loss of this opportunity by the information that, owing to the occurrence of frequent storms of wind, which had blown down many trees, the establishments were almost entirely employed in getting them out of the forests, to the detriment of any regular forest work, which might serve as a guide, and that I would have an opportunity of seeing floating and improvement of rivers to the best advantage in the Black Forest, which I afterwards found to be the case.

I may mention that Herr von Baldinger dissuaded me from visiting *Kranzberg*, between Munich and Freysing, and the *Haupt Moor*, at Bamberg, which are specially mentioned in Dr. Brandis' memorandum, as he said they did not now present any points of special interest such as could

be found in the Baierische Wald, the Bavarian Alps, and some parts of the province of Schwaben.

Area and classification.

The forests of Bavaria extend over an area of 7,622,045 *tagwerks*, equal to 6,417,685 English acres (a *tagwerk* is ·84199 of an English acre), but of this extent 3,709,624 tagwerks, or nearly 50 per cent., are private forests, leaving 3,294,219 English acres as the forest area under State management. This is classed as,—

a. Purely State Forests	- -	2,318,623 acres.
b. Communal „	- -	859,494 „
c. Ecclesiastical „	- -	116,102 „

263,159 acres are classed as unproductive, leaving in round numbers 3,000,000 English acres, covered with forests under the management of the Government forest department.

Yield.

It is difficult to arrive at the actual yield of timber, as it is divided or classified in a manner very difficult to explain in English, and which would occupy too much space here, and the measurement or method of estimating cubical contents varies according to class. The yield of the purely state forests may be roughly stated at upwards of 130,000,000 cubic feet, including faggots and stumps; and of this large quantity, upwards of 26,000,000 cubic feet may be classed as timber fit for building and similar uses. The average yield per English acre, including faggots, may be taken as 63 cubic feet.

Receipts and disbursements.

During the finance period extending from 1861 to 1867 the average annual cash receipts were close on 12,000,000 florins (1,071,428*l.*), whilst the ordinary expenditure classed under, (*a.*) establishments, (*b.*) working charges, (*c.*) planting, &c., (*d.*) construction of roads, amounted to close on 5,000,000 florins (446,428*l.*) and the extraordinary, which consisted of sums allotted out of the annual income, for, 1st, buying up or commutation of servitudes, and, 2nd, purchase of woods and plantations, is set down at 536,028 florins (47,859*l.*). These figures leave a clear sum of 6,676,471 florins, equal to 596,113*l.*, as the cash profit of the forest, to which is added the value of timber and firewood, grazing and other forest rights given free, estimated at upwards of 2,000,000 florins, leaving 8,819,779 florins, or 785,964*l.*, as the actual annual profit during the period under review. This represents close upon 4 florins (7*s.* 4*d.*) per tagwerk, and is an increase of fully a florin per tagwerk on the former period of seven years extending from 1856 to 1861, with which it is compared. This result must be very gratifying to the forest officers and all concerned.

An average extent of 35,000 tagwerks was planted or sown annually during the period under review, representing 37,000,000 of young plants, and 1,000,000 pounds of seed. I am unable to state the cost of the plantations, as it is mixed up with that of promoting natural reproduction, draining, &c., and there appears to be in some parts of the kingdom a system of "*socage*," or performance of work without cash payment, in consideration of certain privileges, which renders it difficult to arrive at a correct estimate of the expenditure. It is not without interest to note, that so recently as 1855 parties found guilty of breaches of forest rules were liable to be, and actually were, punished by enforced labour in the forests and plantations. Area planted or sown annually.

During the period 1859–60 to 1866–67, 60,234 tagwerks were added to the area of the State forests, by purchase, costing 5½ million florins, and some 3,000 tagwerks by exchange; 9,155 tagwerks were sold to the public for upwards of 2½ millions of florins, or 286 florins per tagwerk. The purchases consisted mainly of pieces of land abutting on, or even running in between the forests, and their acquisition will facilitate better arrangements for conservancy, formation of the complexes, &c. The sales were for the most part detached pieces of land, more valuable for agriculture than the rearing of timber.

The area under wood in Bavaria in proportion to the total area and population is very great, representing 34 per cent. of the former, and 1½ tagwerk or upwards of an English acre per head of the latter.

During the two finance periods extending from 1853 to 1867, much appears to have been done towards the commutation and buying up of forest rights. In this most important matter nearly 6,000,000 of florins have been spent, and 13,000 tagwerks of forest ground given up; but for this the forest department has extinguished for ever 2,425 rights to building timber, 4,810 rights to firewood, 2,425 rights to straw and grass from the forests, 1,780 rights to grazing, and 301 miscellaneous rights. The rights to straw, litter, and grass are, perhaps, the most prejudicial of any (regarded from a forest officer's point of view), as they consisted not only of the right to remove the grass found growing in certain tracts, but also to prevent any planting, which might at any time cause a cessation or diminution in its growth. Commutation of forest rights.

The Bavarian forest department forms, as in Prussia, a subdivision of the finance department, and is administered by a technical councillor and Oberland Forstmeister and three

forest councillors at the head-quarters of the ministry (Munich). Bavaria being divided into nine provinces, there is also a forest councillor at the head-quarters of each province, and, as a rule, two *Kreis Forstmeisters*, or inspectors, for each province. There are 74 divisions or circles, each with a Forstmeister aided by at least two assistants as supervising officers, 614 Oberforsters, and 1,622 foresters, sub-foresters, and overseers.

The *personel* of the department thus consists of one inspector-general and member of council, 12 councillors (three in the finance ministry and one for each province), one director and 4 professors at the forest academy, one librarian, 17 inspecting and 74 divisional Forstmeisters, 614 Oberforsters, 182 assistants to the Forstmeisters (including 32 employed in the head quarter and provincial offices) 624 foresters, 594 sub-foresters, and 401 overseers. Demarcation, survey, and valuation operations are, as a rule, performed by candidates or probationers for the post of oberforster, as in Prussia; and, in fact, the duties of all grades may be said to be analogous.

Forest academy at Aschaffenburg.

The forest academy is at Aschaffenburg, near the Spessart, and is presided over by a director, aided by four professors, and an assistant or teacher. There were 165 students when I visited the academy, a larger number than I found at any other, and consisting, I was informed, mainly of foreigners, which speaks volumes for the good repute of the Bavarian forest system.

The collection of specimens of timber struck me as being particularly good and well arranged. The specimens are almost all Bavarian, and for the most part collected from the various forests of the Spessart.

Districts visited.

I visited the *Sachsenried* and *Frankenhofen* reviers in the *Kaufbeuern* division of the province of Schwaben, and was much struck with the fine growth of spruce, which surpassed any I saw in Germany, the trees being of great height, and with clean straight stems.

The tagwerk (less than $\frac{4}{5}$ of our acre) is here estimated to produce an average of 100 cubic feet per annum, which is very high, but I can well believe it after a personal inspection of the reviers. Planting of land, recently acquired by purchase, was being carried on, chiefly spruce with a little silver fir. In one part they were trying sowing along with corn, the expense of preparing the land, sowing, and clearing, after removal of the crop, being borne by the cultivator. The experiment promised well. A large percentage of these reviers is at present in the oldest period, with trees

100 years old and upwards, which renders it difficult to work them systematically.

The Oberforster was busy with a forest road, which he was constructing under the most adverse circumstances, the material in the neighbourhood being bad, and allotment small.

I was accompanied on this trip by the assistant to the divisional Forstmeister, who was himself engaged, having appointed to meet several parties on important business. The assistant proved a most efficient substitute, and, as well as the Oberforsters, appeared thoroughly to understand and take an interest in forestry in all its branches. I was struck by the excellence of the forest house where we had luncheon, and could only wish we had something similar in India. I intended to have accompanied the Forstmeister to a gathering of forest officers on the frontiers of Wurtemberg, to which he was kind enough to invite me, but the weather turned out so bad that I thought it better to proceed to Lindau, at the foot of the *Boden-see* (Lake of Constance), where I called on the Oberforster, but did not do more than casually walk through some of the plantations, as it happened to be a public holiday.

This revier is like those just mentioned, noted for the fine growth of spruce.

I next visited the reviers of Waldaschaff and Rothenbuch in the Spessart (province of Unterfranken). These reviers, with an area of 6,812 and 10,912 tagwerks respectively, consist mainly of hard wood forests, oak (chiefly the *Sessiliflora*) and the beech predominating, and are specially of interest from the fact that, notwithstanding a favourable soil and not unfavourable climate, the oak was at one time in great danger of disappearing altogether, giving place to the beech, and even less valuable trees, such as birch, aspen (*Populus tremula*), and that the main object during the past 100 years has been to encourage its growth and mitigate the damage done to some of the finest forests of the kingdom by mismanagement and neglect.

Space does not admit of the causes which led to the deterioration of the fine forests of the Spessart being detailed here; suffice it that they consisted mainly of the felling of the finest trees of the better descriptions as soon as, or even before, they arrived at maturity, impoverishment of the soil by the removal of grass and leaves, which otherwise would have produced a fine rich humus, and the presence of a dense mass of underwood, allowed to grow unchecked and unthinned. The so-called "*plänter betrieb*" was then in force, but even this was not worked out upon any principles of

selection or conservancy, and it would perhaps be more correct to say that there was no system at all, and that the best trees having been recklessly felled, those of the inferior descriptions got the upper hand and prevented any young oaks coming up, whilst they drained the soil already impoverished by the baring of the grass of all its substance, and gave nothing in return.

Early in the present century the matter attracted attention, and every means have since been adopted to favour the growth of the oak, mixed more or less with beech, and, where requisite, with coniferæ, to improve the soil and cover the ground.

The result of these measures is now becoming apparent, and although we must not yet expect to find that regularity in growth and uniform appearance which characterises the best managed forests in Germany, I believe that nowhere else could one meet with finer clumps, and individual trees than in the Rothenbuch revier. The finest oak trees are now being left standing during two or even three periods of rotation, to supply an abundance of seed, and the greatest care is taken to check the growth of inferior descriptions, which will soon be rarely found in the forest.

In some of the more remote portions, where the humus had not been disturbed or destroyed, the growth of the beech and oak is truly magnificent, tracts consisting of 120 to 140 years old beech, mixed with 300 to 400 years old oaks, being not uncommon, the latter with clean trunks running up to 100 feet in height. When we compare these with other portions where the crippled and stunted appearance of the trees shows the effects of unregulated grazing and removal of the grass, burning of the decayed wood and ashes, and forest theft and mischief on the soil and vegetation the result of mismanagement or even want of care and knowledge is most marked. The circumstances are in many respects analagous with what has gone on in India for centuries, and is still more or less permitted. The vast extent of forests, which once clothed the hill sides and extended far into the plains, and the more luxuriant growth of the tropics, have hitherto, or until within the last few years, prevented the gradual deterioration of our forests being marked or felt, but the subject has now luckily attracted attention, and none too soon. If any have doubts in the matter let them visit the Spessart, study the history of its forests, and judge for themselves.

The "*Schläge*" or clearings in the Rothenbuch revier appeared to me somewhat too large and clean, causing a

want of shade for the young crop, which was also in some cases much exposed to the wind.

From these causes, and doubtless also the impoverished state of the soil (which has rendered it imperative in some cases to replant entirely with coniferæ), the growth of the young crop, whether naturally reproduced or planted, is sometimes very slow. In one large tract stated to have been naturally renewed 20 years ago, the young trees are certainly not more than 6 feet high on an average, and in another, replanted 12 years ago, it does not exceed 3 feet. This is however quite exceptional.

Forest laws.

With regard to forest law, Bavaria is divided into two portions, that on the left bank of the Rhine commonly called the Pfalz, and that on the right bank. Up to the year 1846 the forests of the former were managed under the authority of regulations of 1814, and a Forest Act of 1831, which in that year (1846) were revised and embodied in an Act, under the provisions of which the forests have since been administered. Up to the year 1852, there was no general forest law for the provinces on the right bank of the Rhine; numerous regulations and mandates, some of which dated so far back as the seventeenth century, were the only guide.

The Act of 1852 is very comprehensive, and provides for the treatment of all descriptions of forest, state, communal, ecclesiastical, and even private, in cases where the management of the latter has any bearing on the general welfare of the people or interests of the State; in fact, the extent to which purely private forests are under Government control in Bavaria, where they constitute nearly half of the total area under wood, is very marked. A study of this Act (*Das Forstgesetz Baiern*) is particularly recommended by Dr. Brandis in his memorandum; and I can well imagine, from what I have read of it, that it might serve as a model for guidance in any future legislation on the subject in India; but I have not had time to study it sufficiently to give even an epitome of it here. The salient points, and those in which it differs from the law in force in the Pfalz, are very clearly stated in "*die Forst Verwaltung Baierns*," section 38, pp. 112–141, where the reasons for the continuance of two separate laws in the same kingdom are also stated, and the results of the Acts since they have been in force are shown in tabular statements. (See also an appendix to "*die Forst Verwaltung*," known as "*Forststatistische Mittheilungen aus Bayern*," published in Munich in 1869.)

Breaches of forest laws seem most common in the Pfalz, where the average number in State forests alone is 116 cases

yearly per 1,000 tagwerk, whilst in Oberbayern the average on the same extent is only 9! and throughout the whole kingdom 37. Regarded with reference to population, we find the Pfalz again heading the list, one person out of every seven having apparently been guilty of a breach of forest law, whilst in the province of Nieder Bayern the average is only one in every 279. The same per-centage holds good with regard to the communal and other forests. There is a marked falling off in the number of cases for the period from 1861 to 1867, as compared with the former period of seven years; but it is remarkable that the several provinces retain their relative positions in both.

We must conclude from the above that the law is more stringent and more strictly administered in the Pfalz, where there are also probably greater temptations to break it in the shape of high prices, a convenient market, or great want of grazing ground; for the cases are classed as mischief to, *a*, wood; *b*, pasture; *c*, grass; *d*, straw; *e*, miscellaneous; besides theft of wood and trespass; and the local circumstances of the other provinces must evidently conduce to the frequency of breaches of the law or the reverse.

The average number of cases yearly during the period from 1861–1867 seems very large, amounting to 103,310 for the purely Government forests, and 99,289 in other forests, making a yearly total of 202,599 cases, a decrease, however, of upwards of 50,000 compared with the annual average of the seven years immediately preceding, and of 80,000 compared with that from 1849 to 1853. The usual punishment would appear to be by fine, with imprisonment in default.

I must now close this very imperfect report of what I saw and learned in Bavaria, and endorse Dr. Brandis' recommendation of a study of "Die Forst Verwaltung Bayerns" to all who are anxious to make themselves thoroughly acquainted with an excellent and comprehensive system of forest management.